Waste Site Reclassification Form

Date Submitted: 07/27/04 **Originator:** R. A. Carlson **Phone:** 373-9759	**Operable Unit(s):** 100-KR-2 **Waste Site ID:** 100-K-31 **Type of Reclassification Action:** Rejected ☐ Closed Out ☐ Interim Closed Out ☒ No Action ☐	**Control Number:** 2004-038 **Lead Agency:** EPA RECEIVED SEP 09 2004 EDMC

This form documents agreement among the parties listed below authorizing classification of the subject unit as rejected, closed out, interim closed out, or no action and authorizing backfill of the site, if appropriate. Final removal from the National Priorities List of no action, interim closed out, or closed-out sites will occur at a future date.

Description of current waste site condition:

Sampling and evaluation of this site have been performed in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington. The selected action involved (1) sampling of the site, (2) cleaning up the site, (3) demonstrating through a combination of field screening and verification sampling that cleanup goals have been met, and (4) proposal for interim close out.

Basis for reclassification:

The 100-K-31, 183-KE Sulfuric Acid Tank (East Tank) site meets the remedial action objectives (RAOs) specified in the Remaining Sites ROD. The results demonstrated that residual contaminant concentrations support future unrestricted land uses that can be represented (or bounded) by a rural-residential scenario. Also, the results showed that residual contaminant concentrations support unrestricted future use of the shallow zone soil (i.e., surface to 4.6 m [15 ft]) and that contaminant levels remaining in the soil meet the RAOs for direct exposure and are protective of groundwater and the Columbia River. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 100-K-31, 183-KE Sulfuric Acid Tank (East Tank)* (attached).

J. Zeisloft DOE-RL Project Lead	Signature	7/29/04 Date
NA Ecology Project Manager	Signature	Date
L. E. Gadbois EPA Project Manager	Laurence E Gadbois Signature	8-2-2004 Date

REMAINING SITES VERIFICATION PACKAGE FOR 100-K-31, 183-KE SULFURIC ACID TANK (EAST TANK)

Attachment to Waste Site Reclassification Form 2004-038

July 2004

REMAINING SITES VERIFICATION PACKAGE FOR 100-K-31, 183-KE SULFURIC ACID TANK (EAST TANK)

EXECUTIVE SUMMARY

The 100-K-31 site is located within the 100-KR-2 Operable Unit in the 100-K Area of the Hanford Site. The site consists of two aboveground, U-shaped concrete bases that historically supported a cylindrical tank and associated aboveground piping. The tank was used to store sulfuric acid and was 3 m (10 ft) in diameter, 10 m (33 ft) long, and had a 77,140-L (20,380-gal) capacity. The tank was removed sometime prior to 1994, and the aboveground piping was removed in June 2000.

Confirmatory sampling was conducted at the 100-K-31 site during April 2003, using a phased sampling approach. Field screening for pH following a systematic grid of the site, plus screening of soil-stained areas, were used to determine the focused/judgmental soil and waste material sample locations for laboratory analysis. The focused/judgmental sample strategy also was based on visual evaluation of the site, photographs, historical acid tank use information, and suspected waste materials. In addition, biased samples of stained areas on the concrete bases were collected. A total of four soil samples, one concrete base sample, and field quality control samples were analyzed for chromium (hexavalent and total), arsenic, barium, cadmium, lead, selenium, silver, mercury, sulfate, and pH.

The confirmatory sampling analytical laboratory results for barium, hexavalent chromium, lead, and mercury exceeded the direct exposure and/or groundwater protection action levels for soil. For the concrete samples, the maximum detected results for barium, cadmium, and hexavalent chromium exceeded the applicable remedial action goals (RAGs). This indicated that site remediation (remove, treat, and dispose) was required. A cleanup action was implemented during December 2003, removing the concrete bases and about 0.61 m (2 ft) of contaminated soil from the 100-K-31 site and disposing of them at the Environmental Restoration Disposal Facility.

Verification sampling was conducted during December 2003 and January 2004. The results indicated that the cleanup action achieved compliance with the remedial action objectives for the 100-K-31 site. A summary of the evaluation of analytical results against the "Model Toxics Control Act—Cleanup" (*Washington Administrative Code* 173-340) criteria is presented in Table ES-1. The results of the verification sampling event are being used to make decisions for reclassifying the 100-K-31 site in accordance with the reclassification guideline TPA-MP-14 (DOE-RL 1998) process.

In accordance with this evaluation, the verification sampling results support a reclassification of this site to interim closed out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2004b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (EPA 1999). These results also show that residual soil contaminant concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario; that residual contamination supports unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]); and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River.

Table ES-1. Status of Remedial Action Objectives for the 100-K-31 Site.

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	There are no radionuclide COPCs for this site.	Not applicable
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COPC concentrations are below the direct exposure criteria.	Yes
Risk Requirements – Nonradionuclides	Hazard quotient of <1 for all individual noncarcinogens.	The hazard quotient for all individual noncarcinogenic COPCs is less than 1.	Yes
	Cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient (0.36) is less than 1.	
	Excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	Hexavalent chromium is the only nonradionuclide carcinogen identified at the site; its excess cancer risk (1.05×10^{-7}) is less than 1×10^{-6}.	
	Cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	Total excess cancer risk (1.05×10^{-7}) is less than 1×10^{-5}.	
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	There are no radionuclide COPCs for this site.	Not applicable
	Attain national primary drinking water standards [a]: 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5.[b]		
	Meet total uranium standard of 21.2 pCi/L.[c]		
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Maximum detected results for lead and mercury are above groundwater and river protection RAGs. However, RESRAD modeling results indicate that they will not reach groundwater (and, therefore, the Columbia River) within 1,000 years. Therefore, their residual concentrations achieve the RAOs for groundwater and river protection.	Yes

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).
[b] *Radiation Protection of the Public and the Environment* (DOE Order 5400.5).
[c] Based on the isotopic distribution of uranium in the 100 Areas, the 30 µg/L MCL corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in *Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater* (BHI 2001).

COPC = contaminant of potential concern
DOE = U.S. Department of Energy
MCL = maximum contaminant level
RAG = remedial action goal
RAO = remedial action objective
RESRAD = RESidual RADioactivity (dose model)

REMAINING SITES VERIFICATION PACKAGE FOR 100-K-31, 183-KE SULFURIC ACID TANK (EAST TANK)

STATEMENT OF PROTECTIVENESS

The 100-K-31, 183-KE Sulfuric Acid Tank (East Tank) site sample results demonstrate that the site achieves the remedial action objectives (RAOs) and remedial action goals (RAGs) as established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2004b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (EPA 1999). Evaluation of sampling results from the 100-K-31 site demonstrate that residual soil contaminant concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario; that residual contamination supports unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]); and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River.

GENERAL SITE INFORMATION AND BACKGROUND

The 100-K-31 site is located within the 100-KR-2 Operable Unit in the 100-K Area of the Hanford Site. The site consists of two aboveground, U-shaped concrete bases that historically supported a cylindrical tank and associated aboveground piping. The tank was used to store sulfuric acid and was 3 m (10 ft) in diameter, 10 m (33 ft) long, and had a 77,140-L (20,380-gal) capacity. The tank was removed sometime prior to 1994, and the aboveground piping was removed in June 2000. The sulfuric acid storage tank was associated with the 183-KE Water Treatment Plant. The period during which the storage tank facility was active is not known. The 100-K-31 Waste Information Data System (WIDS) summary report is presented in Appendix A.

CONFIRMATORY SAMPLING ACTIVITIES

Site Walkdown

A site walkdown with the U.S. Department of Energy, Richland Operations Office, the lead regulatory agency (U.S. Environmental Protection Agency [EPA]), and the project team was performed during March 2003. The objective of the walkdown was to gather the necessary information to finalize the sampling requirements specified in the 100-K-31 waste site evaluation (BHI 2003b). The walkdown verified that the site has not changed from the description and photographs in WIDS. The ground surface is composed of about 2.5 to 15 cm (1 to 6 in.) of crushed gravel. There were visible yellow stains on the gravel in several locations, as well as some smaller areas of disturbed gravel with finer particle sizes, indicating possible corrosion by sulfuric acid.

Contaminants of Potential Concern

The contaminants of potential concern (COPCs) for the 100-K-31 waste site were identified based on process knowledge pertaining to the characteristics of the sulfuric acid used in historical water treatment processes on the Hanford Site. The COPCs include chromium (hexavalent and total), arsenic, barium,

cadmium, lead, selenium, silver, mercury, sulfate, and pH. The sulfuric acid tanks were part of the water treatment plant facilities, and were located far from any radiological operations; therefore, there are no radiological COPCs for this site.

Confirmatory Sample Design

Confirmatory sampling was conducted at the 100-K-31 site during April 2003. Sampling followed a phased approach using field pH measurements on a systematic grid to evaluate surface soils for acid spill contamination (Phase 1). The results of the field pH measurements were used to identify biased soil sample locations for laboratory analyses (Phase 2). In addition, biased samples of the concrete bases were collected to evaluate possible contamination.

For Phase 1, the site was stratified into four areas based on tank use information, and on tank construction drawings (GE 1956a, GE 1956b) that indicated where acid leaks/spills might have occurred. The *Visual Sample Plan* software tool (PNNL 2002) was then used to establish a systematic triangular grid with a random start within three of the four areas to identify field pH measurement locations. Soil sample locations were initially identified based on the pH results.

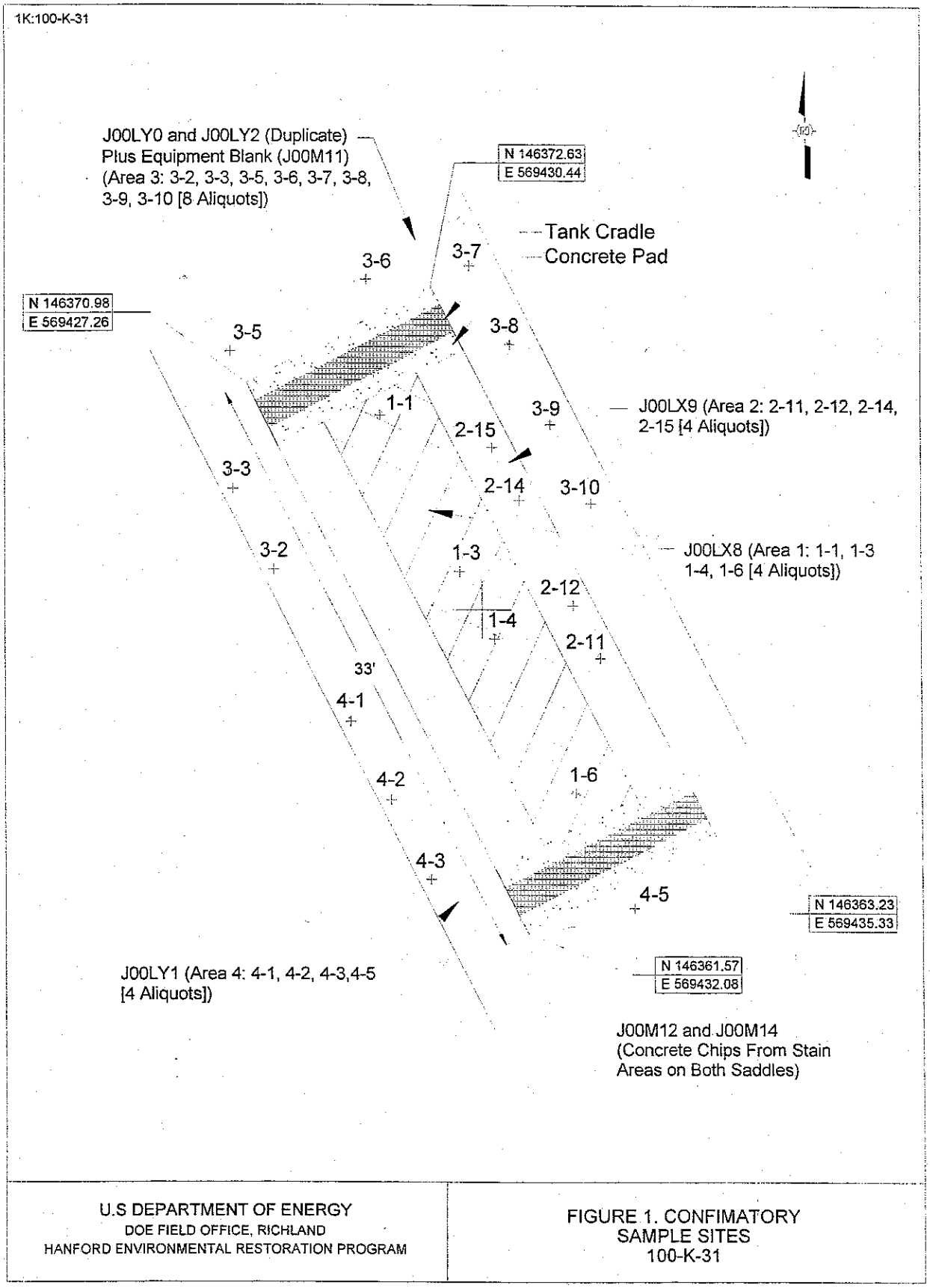
In Phase 2, soil samples from four areas and one duplicate soil sample were submitted to the laboratory for analyses. Field observations of stained gravel and the field pH measurement results were used to determine the focused soil sample locations presented in Figure 1. These samples consisted of the native material from the soil horizon about 7.6 cm (3 in.) below the surface gravel layer. The overlying gravel was not included in the soil samples. Phase 2 also included surface samples from stained concrete base areas. These samples were collected using a chisel to obtain enough material for the required analyses. Phase 2 field quality control (QC) samples included a duplicate soil sample and an equipment blank (using clean silica sand). Table 1 provides the confirmatory sample summary.

Confirmatory Sample Results

Confirmatory soil and concrete samples were analyzed using EPA-approved analytical methods. The sample results are stored in the Environmental Restoration (ENRE) Project-Specific Database prior to archiving in the Hanford Environmental Information System (HEIS) and are included in Appendix B (Table B-1).

Surface soil samples were taken from under and around the former tank locations. Samples also were taken from stained surfaces of the concrete bases. For the concrete samples, the maximum detected results for barium, cadmium, and hexavalent chromium exceeded the applicable RAGs. Evaluation of the analytical soil data showed that the maximum detected results for barium, hexavalent chromium, lead, and mercury exceeded the RAGs for direct exposure and/or groundwater protection. Therefore, the site was recommended for remedial action. (See Table 3 for a comparison of maximum soil analytical values to action levels.)

Figure 1. Confirmatory Sample Locations at the 100-K-31 Site.



U.S DEPARTMENT OF ENERGY DOE FIELD OFFICE, RICHLAND HANFORD ENVIRONMENTAL RESTORATION PROGRAM	FIGURE 1. CONFIMATORY SAMPLE SITES 100-K-31

Table 1. Confirmatory Sample Summary Table.[a]

Sample Location	Sample Media	HEIS Sample Number	Sample Analyses
Area 1	Soil	J00LX8	As, Ba, Cd, Cr (hexavalent and total), Pb, Se, Ag, Hg, sulfate, and pH.
Area 2	Soil	J00LX9	
Area 3	Soil	J00LY0	
Area 4	Soil	J00LY1	
Stained concrete surfaces	Concrete	J00M12, J00M14	J00M12: As, Ba, Cd, Cr (total), Pb, Se, Ag, Hg, sulfate, and pH. J00M14: Cr (hexavalent).
Felt (top of concrete base)	Felt	No felt present	Asbestos, PCB, As, Ba, Cd, Cr (total), Pb, Se, Ag, Hg, sulfate, and pH.
Additional Quality Control Samples			
Duplicate	Soil	J00LY2	As, Ba, Cd, Cr (hexavalent and total), Pb, Se, Ag, Hg, sulfate, and pH.
Equipment blank	Silica sand	J00M11	As, Ba, Cd, Cr (total), Pb, Se, Ag, Hg, and sulfate.

[a] Logbook EL-1578 (Bowers 2003).
HEIS = Hanford Environmental Information System
PCB = polychlorinated biphenyl

REMEDIAL ACTION SUMMARY

The remove, treat, and dispose (RTD) decision for the 100-K-31 site was supported by the site confirmatory sample results. For the concrete samples, the maximum detected results for barium, cadmium, and hexavalent chromium exceeded the applicable RAGs. The maximum soil analytical results for barium, hexavalent chromium, lead, and mercury also exceeded action levels indicating that remediation of the site (RTD) was required.

Based on the lateral COPC distribution at the site (defined through surface soil sampling) and vertical distribution information for the site contaminants of concern (COCs) (defined through a test pit at 100-K-33, which is very similar to 100-K-31), a cleanup action was developed and implemented during December 2003. This cleanup action involved removal of the concrete bases and about 0.61 m (2 ft) of contaminated soil from the 100-K-31 site and disposal at the Environmental Restoration Disposal Facility.

VERIFICATION SAMPLING ACTIVITIES

Contaminants of Concern

The COCs for the remedial action of the 100-K-31 waste site were identified based on the results of the confirmatory sampling effort. Three COPCs (selenium, silver, and sulfate) were excluded from the verification sampling analyte list because their confirmatory sampling results did not exceed the RAGs. Because pH was included as a COPC only to indicate possible contamination locations during confirmatory sampling, it also was excluded from the final verification sampling COC list. The COCs included in verification sampling were chromium (hexavalent and total), arsenic, barium, cadmium, lead, and mercury. Although arsenic, cadmium, and total chromium did not exceed the RAGs during

confirmatory sampling of site surface soils, they were included in the verification sampling to ensure that they were not present above action levels below the ground surface.

Verification Sample Design

Following remediation, verification sampling was conducted at the 100-K-31 site during December 2003 and January 2004. The verification sample locations are presented in Figure 2. Four aliquots were collected in the same locations as the confirmatory samples for Areas 1, 2, and 4 (samples J01757, J01758, and J015W2). The soil samples consisted of the native soil at the bottom of the excavated area that represented a soil horizon about 0.61 m (2 ft) below the ground surface. Field QC samples included a duplicate sample (J01759) and a clean silica sand equipment blank sample (J01756).

Area 3 was not sampled again during the verification sampling effort because none of the 100-K-31 COPCs exceeded the direct exposure action levels. Although three COPCs (barium, lead, and mercury) exceeded the groundwater/river protection levels, RESidual RADioactivity (RESRAD) model results for the most mobile COPC (lead) indicated that even though its value exceeded the groundwater/river protection RAG, lead would not reach groundwater within 1,000 years (BHI 2004a). The two less mobile COPCs (barium and mercury), with their higher Kd values, would not be expected to reach groundwater or the Columbia River within 1,000 years. Table 2 presents the verification sampling effort summary.

Table 2. Verification Sample Summary Table.[a]

Sample Location	Sample Media	HEIS Sample Number	Sample Analyses
Area 1	Soil	J01757	As, Ba, Cd, Cr (hexavalent and total), Pb, and Hg.
Area 2	Soil	J01758	
Area 4	Soil	J015W2	As, Ba, Cd, Cr (hexavalent and total), Pb, and Hg.
Additional Quality Control Samples			
Duplicate	Soil	J01759	As, Ba, Cd, Cr (hexavalent and total), Pb, and Hg.
Equipment blank	Silica sand	J01756	As, Ba, Cd, Cr (hexavalent and total), Pb, and Hg.

[a] Logbook EL-1572-1 (Fahlberg 2003).

Verification Sampling Results

The samples were analyzed using EPA-approved analytical methods. The verification sample results are stored in ENRE prior to archiving in HEIS and are included in Appendix B (Table B-2). Except for lead and mercury, all COCs are less than background or applicable RAGs. A comparison of the site RAGs and the maximum contaminant results is presented in Table 3.

Figure 2. Verification Sample Locations at the 100-K-31 Site.

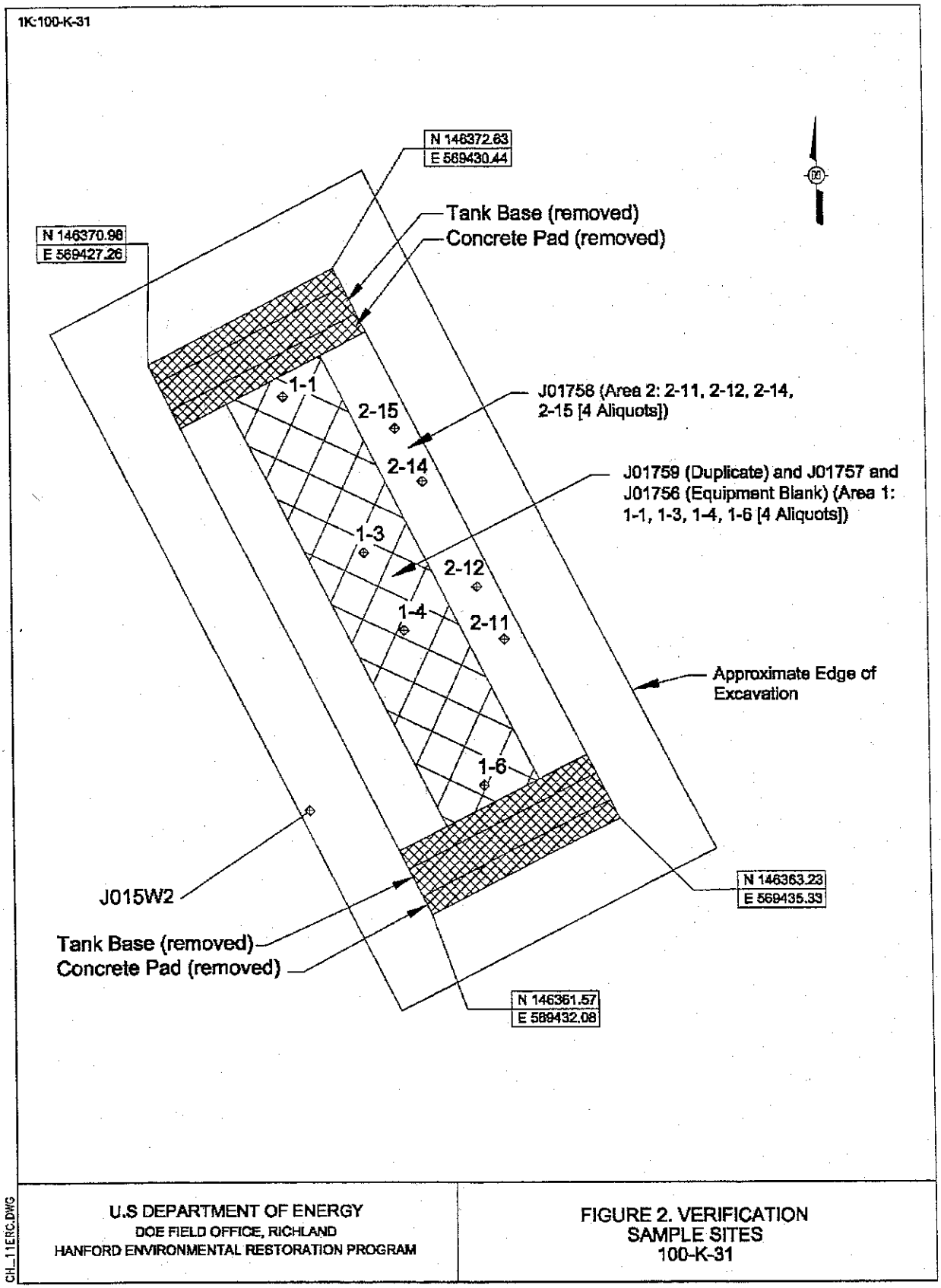


Table 3. Comparison of Maximum Soil Sample Values to Action Levels.

COPC/COC	Maximum Result (mg/kg)			RAGs (mg/kg)			Does the Maximum Result Meet the RAGs?		
	1st Sample Event (Confirmatory)		2nd Sample Event (Verification)	Direct Exposure	Groundwater Protection	River Protection	1st Sample Event (Confirmatory)		2nd Sample Event (Verification)
	Soil	Concrete					Soil	Concrete	
Nonradionuclides									
Arsenic	2.7 (<BG)	3.1 (<BG)	3.8 (<BG)	20[a]	-20[a]	20[a]	Yes	Yes	Yes
Barium	169	418	88.1	5,600	132[b]	--[c]	No	No	Yes
Cadmium[d]	0.75 (<BG)	36.1	0.16 (<BG)	13.9	0.81[b]	0.81[b]	Yes	No	Yes
Chromium (total)	17.5 (<BG)	33.8	10.3 (<BG)	80,000	18.5[b]	18.5[b]	Yes	No	Yes
Chromium (hexavalent)[e]	2.6	3.54	0.22	400[f] 2.1[g]	8	2	No	No	Yes
Lead	23.3	4.5 (<BG)	43.4	353[h]	10.2[b]	10.2[b]	No	Yes	Yes[i]
Mercury	35.4	0.04 (<BG)	5.2	24	0.33[b]	0.33[b]	No	Yes	Yes[i]
Selenium	0.55	NA	NA	400	5	1	Yes	NA	NA
Sulfate	8,430	235 (<BG)	NA	--[j]	25,000	--[c]	Yes	Yes	NA

[a] The cleanup value of 20 mg/kg has been agreed to by Tri-Party project managers.
[b] Where cleanup levels are less than background or required detection limits (RDLs), cleanup levels default to background or the RDL, whichever is highest (WAC 173-340-700[4][d] and WAC 173-340-707[2]).
[c] A river protection value cannot be calculated because there are no published surface water maximum contaminant level standards.
[d] Hanford Site-specific background for cadmium is not available; background value is from Ecology (1994).
[e] There is no Washington State or Hanford Site background value for hexavalent chromium.
[f] WAC 173-340-740(3) noncarcinogenic cleanup limit.
[g] WAC 173-340-750(3) carcinogenic cleanup limit based on the inhalation exposure pathway; see *Calculation of Hexavalent Chromium Carcinogenic Risk* (BHI 2000).
[h] Value calculated using *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children* (EPA 1994).
[i] The RESRAD model results (BHI 2004a) indicate that the COC does not reach groundwater or the river within 1,000 years.
[j] There is no published direct exposure criteria.
BG = background
COC = contaminant of concern
COPC = contaminant of potential concern
NA = not applicable
RAGs = remedial action goals
WAC = *Washington Administrative Code*

DATA EVALUATION

The maximum detected soil verification sampling results for lead and mercury meet the direct exposure RAGs but are above the groundwater and river protection RAGs. However, site-specific RESRAD modeling results (BHI 2004a), using COC distribution information from the 100-K-33 test pit (BHI 2004b), indicate that they will not reach groundwater or the Columbia River within 1,000 years. Therefore, the lead and mercury residual concentrations achieve the RAOs for groundwater and river protection.

Nonradionuclide risk requirements for interim site closure include a site individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual COC carcinogenic risk of less than 1×10^{-6}, and a cumulative COC carcinogenic risk of less than 1×10^{-5}. For the 100-K-31 site, these risk calculations were conservatively calculated using maximum residual COC soil concentrations after site remediation. Arsenic, cadmium, and total chromium were not used in the risk calculations because following remediation they were present at concentrations below background levels. The individual hazard quotients for barium, hexavalent chromium, lead, and mercury are less than 1.0 (0.016, 0.001, 0.123, and 0.217, respectively). The cumulative hazard quotient for these four COCs is 0.36 (also less than 1.0). Hexavalent chromium is the only nonradionuclide carcinogenic COC present above background levels at the 100-K-31 site. Therefore, the hexavalent chromium individual and cumulative carcinogenic risk values are both 1.05×10^{-7}. This value is less than the 1×10^{-6} individual and the 1×10^{-5} cumulative risk requirements.

A typical Hanford Site RAG compliance requirement for nonradionuclides is the *Washington Administrative Code* 173-340-740(7)(e) three-part test. However, this test is used for statistically based verification approaches only, and is not applicable to the 100-K-31 verification data where maximum detected concentrations are used as the compliance basis.

DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the sample locations and the resulting field and analytical data with the sampling and data requirements specified by the project objectives and performance specifications. This review was used to determine if samples were collected in accordance with the sample design. The review also involved an evaluation of the confirmation and verification sample analytical data to determine if they are the right type, quality, and quantity to support project decisions (e.g., remedial action needs, interim site closure). A DQA completes the data life cycle of planning, implementation, and assessment that was initiated by the data quality objective process.

The DQA was performed in accordance with BHI-EE-01, *Environmental Investigations Procedures*, Procedure No. 1.22, "Data Quality Assessment." Specific data quality objectives for the site are found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2004a). The data quality requirements in the SAP are used for assessing data from statistical sampling and do not specifically apply to the data sets resulting from the focused sampling performed for the remaining sites. However, to ensure quality data sets, the SAP data assurance requirements are followed, where appropriate.

The data review for the 100-K-31 waste site determined that the analytical data are the right type, quality, and quantity to support site remediation decisions within specified error tolerances. All analytical data were found acceptable for decision-making purposes (BHI 2003a).

The quality assurance deviations for the confirmatory samples include the following:

- The relative percent difference (RPD) for concrete base cadmium concentrations (32.5%) was outside the 30% RPD guidance
- The method blank for barium exceeded the practical quantitation limit.

The DQA confirmed that these deviations have little or no effect on the usability of the data, and the sample design and analytical data are sufficient to support the decision to implement a cleanup action at the 100-K-31 site.

The quality assurance deviations for the verification soil samples include the following:

- The RPD for mercury (37.9%) was outside the 30% RPD guidance
- The RPD for the duplicate mercury analysis (31.8%) was outside the 30% RPD guidance
- The matrix spike recovery for lead (125.9%) was outside the 75% to 125% control limits
- The ending continuing calibration verification for cadmium (111.2%) was outside the 90% to 110% control limits.

These deviations are minor and are generally attributable to common conditions encountered during laboratory analyses, such as sample heterogeneity and sample matrix effects. All other QC and assurance data were within acceptable limits. Taken as a whole, the QC and assurance information indicates that the verification sample data are of sufficient quality for their intended purpose. The DQA review verifies that the sample design and the resulting analytical data are sufficient to support an interim closure decision for the 100-K-31 site.

SUMMARY FOR INTERIM CLOSURE

A phased sampling approach was implemented at the 100-K-31 site based on site photographs, operational history, suspected waste materials, and statistical information. Confirmatory sampling was conducted during April 2003. The analytical laboratory results for barium (soil and concrete), hexavalent chromium (soil and concrete), cadmium (concrete), lead (soil), and mercury (soil) exceeded action levels, indicating that remediation (RTD) was required. A cleanup action was implemented during December 2003, removing the concrete bases and about 0.61 m (2 ft) of contaminated soil from the 100-K-31 site. Verification sampling was conducted during December 2003 and January 2004. The results indicated that the cleanup action achieved compliance with the RAOs for the 100-K-31 site.

The verification sampling results support reclassification of the 100-K-31 site to interim closed out. The maximum detected results from underlying soil samples collected at locations suspected of having the greatest potential for contamination were shown to meet the cleanup objectives for direct exposure, groundwater protection, and river protection.

REFERENCES

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations,* as amended.

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EPA, 1994, *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children*, EPA/540/R-93/081, Publication No. 9285.7-15-1, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

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GE, 1956a, *Gravity Acid Feed System 100-K Isometric Piping*, June 4, 1956, drawing H-1-20572, General Electric Company, Richland, Washington.

GE, 1956b, *Gravity Acid Feed System, Acid Storage Tank Details,* June 4, 1956, drawing H-1-20569, Sheet 1, General Electric Company, Richland, Washington.

PNNL, 2002, *Visual Sample Plan*, Version 2.0, available at http://dqo.pnl.gov/VSP, Pacific Northwest National Laboratory, Richland, Washington.

WAC 173-340, "Model Toxics Control Act—Cleanup," *Washington Administrative Code*, 1996.

APPENDIX A

WASTE INFORMATION DATA SYSTEM GENERAL SUMMARY REPORT (2 Pages)

Waste Information Data System
General Summary Report

03/09/2004

Site Code: 100-K-31 **Site Classification: Accepted** **Page 1**

Site Names: 100-K-31, 183-KE Sulfuric Acid Tank Bases (East tank)
Site Type: Storage Tank
Status: Inactive
Operable Unit: 100-KR-2
Hanford Area: 100K

Start Date:
End Date:
Coordinates:
(E) 569431.313
(N) 146367.109
Washington State Plane

Site Description: The unit consists of two aboveground U-shaped concrete bases and above-ground piping. The U-shaped bases are 3.7 meters (12 feet) wide, 1.2 meters (4 feet) long, 1.8 meters (6 feet) high, and 10 meters (33 feet) apart. A tank appears at the site in a March 1962 photograph. The cylindrical tank laid horizontally on two concrete U-shaped bases. The tank was 3 meters (10 feet) in diameter, 10 meters (33 feet) long and had a 77,140-liter (20,380 gallon) capacity. It is unknown when the tank was removed. Tank bases and piping remain.

Location Description: The unit is located 14.3 meters (47 feet) northeast of 120-KE-4 (60 degrees).

Process Description: The Sulfuric Acid Storage Tank was associated with 183-KE Water Treatment Plant. West of this tank are two smaller sulfuric acid tanks (120-KE-4 and 120-KE-5) and another tank the same size as the one described here, all of which were used for the same purpose.

Associated Structures: This site is associated with 100-K-30 and the 183-KE Water Treatment Plant.

Site Comment: It is unknown when the tank was removed or what was done with it. The tank bases and piping were not removed and are still located at the site.

References:

1. Carpenter, RW and SL Cote, 1994 100-K Area Technical Baseline Report, WHC-SD-EN-TI-239, Rev 0.
2. Kathryn Moss, 9/14/94 WIDS Site Addition: 100-K-31 (#94-298).
3. 6/04/03 Waste Site Evaluation for 100-K-31 Sulfuric Acid Tank, 0100K-CA-V0012, Rev 1.

Waste Information:

Type: Chemicals
Category: Hazardous/Dangerous
Physical State: Liquid
Description: The tank was used to store sulfuric acid.
References: 1. Carpenter, RW and SL Cote, 1994 100-K Area Technical Baseline Report, WHC-SD-EN-TI-239, Rev 0.

Dimensions:

Length:	1.22	Meters	4.00	Feet
Width:	3.66	Meters	12.00	Feet
Depth/Height:	1.83	Meters	6.00	Feet

Comments: The two tank bases are 10 meters (33 feet) apart.
References: 1. Carpenter, RW and SL Cote, 1994 100-K Area Technical Baseline Report, WHC-SD-EN-TI-239, Rev 0.

Field Work:

Type: GPS Surveys
Begin Date: 04/01/1998
End Date: 04/01/1998
Purpose: Mapping

Field Crew: K.A. Prosser, C. Webb, W. Hayward
Data Repository: HGIS

Site Code: 100-K-31 **Site Classification: Accepted**

Comment: The outer edge of the concrete cradle was located using a Global Positioning System (GPS).
Job Number: 151
Type: Real-Time Kinematic

Type: Surveillance Walkdowns
Begin Date: 04/01/1998
End Date: 04/01/1998
Purpose: Surveillance

Type: Analytical Sampling
Begin Date: 04/16/2003
End Date: 04/17/2003 **Data Repository:** HEIS
Purpose: Evaluation
Comment: During the sampling event on April 16 and 17, 2003, surface samples were taken from under and around the former tank locations and from the stained surfaces of the concrete saddles. Chromium VI was found at a level of 3.54 ppm in a stained area on the concrete saddle, and at 2.6 in a soil sample, both above the RAG of 2.1 ppm established in the RDR/RAWP (DOE-RL-96-17, Rev. 4). The site was recommended for remedial action because of the chromium VI, cadmium, and mercury. Sample results are listed using HEIS numbers of J00LX8 and J00LX9, J00LY0 through J00LY2, J00M11, J00M12 and J00M14.
References: 1. 6/04/03 Waste Site Evaluation for 100-K-31 Sulfuric Acid Tank, 0100K-CA-V0012, Rev 1.

Regulatory Information:

Programmatic Responsibility

DOE Program: EM-40 **Confirmed By Program:** Yes
DOE Division: ERD - Environmental Restoration Division
Responsible Contractor/Subcontractor: BHI. Bechtel Hanford, Inc.

Site Evaluation

Solid Waste Management Unit: No
TPA Waste Management Unit Type: Other Storage Area
This site was consolidated with:

Reason:

Permitting

RCRA Part B Permit: No **TSD Number:**
RCRA Part A Permit: No **Closure Plan:** No
RCRA Permit Status:
Septic Permit: No **216/218 Permit:** No
Inert Land Fill: No **NPDES:** No
State Waste Discharge Permit: No
Air Operating Permit: No

Tri-Party Agreement

Lead Regulatory Agency: EPA
Unit Category: CERCLA Past Practice (CPP)
TPA Appendix: C

Remediation and Closure

Decision Document: Interim Action Record of Decision, 100 Area Remaining Sites (1999)
Decision Document Status: Final
Remediation Design Group: Group 5
Closure Document:
Closure Type:
Post Closure Requirements: **Residual Waste:**

APPENDIX B

100-K-31 SAMPLE RESULTS
(2 Pages)

Table B-1. 100-K-31 Confirmatory Sampling Data Summary.

Sample Area and Depth BGS	HEIS Number	Sample Date	Arsenic			Barium			Cadmium			Chromium			Hexavalent Chromium			Lead Value		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
1 3" bgs	J00LX8	04/16/03	1.8		0.37	74.3		0.01	0.2		0.04	17.5		0.06	2.6		0.44	16.9		0.28
2 3" bgs	J00LX9	04/16/03	2		0.36	69.9		0.01	0.19		0.04	15.5		0.06	0.45	U	0.45	23.3		0.27
3 3" bgs	J00LY0	04/16/03	2.7		0.33	169		0.01	0.75		0.04	9.6		0.06	0.43	U	0.45	13.4		0.25
4 3" bgs	J00LY1	04/16/03	1.7		0.37	64.7		0.01	0.18		0.04	9.8		0.06	0.43	U	0.43	21.9		0.27
Duplicate of J00LY0	J00LY2	04/16/03	2.6		0.34	65.4		0.01	0.31		0.04	7.8		0.06	0.43	U	0.43	12.6		0.25
Equipment Blank of J00LY0	J00M11	04/16/03	0.33	U	0.33	1.1		0.01	0.04	U	0.04	0.09		0.06				0.46		0.25
Stained Concrete	J00M12	04/17/03	3.1		0.35	418		0.01	36.1		0.04	33.8		0.06				4.5		0.26
Stained Concrete	J00M14*	04/17/03													3.54		0.35			

Sample Area and Depth BGS	HEIS Number	Sample Date	Mercury			Selenium			Silver			Sulfate			pH
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	
1 3" bgs	J00LX8	04/16/03	20.8		0.44	0.55		0.37	0.09	U	0.09	8220		273	7
2 3" bgs	J00LX9	04/16/03	27.9		0.43	0.51		0.34	0.08	U	0.08	8430		282	5.5
3 3" bgs	J00LY0	04/16/03	3.2		0.08	0.4		0.34	0.08	U	0.08	2290		271	6.8
4 3" bgs	J00LY1	04/16/03	35.4		0.4	0.38	U	0.38	0.08	U	0.08	3960		271	6.5
Duplicate of J00LY0	J00LY2	04/16/03	3.7		0.08	0.35	U	0.35	0.08	U	0.08	2460		271	6.9
Equipment Blank of J00LY0	J00M11	04/16/03	0.02	U	0.02	0.34	U	0.34	0.08	U	0.08	1.2	U	1.2	
Stained Concrete	J00M12	04/17/03	0.04		0.02	0.36	U	0.36	0.08	U	0.08	235		25.4	9.5

* Only analyte was hexavalent chromium.
bgs = below ground surface (soil sample depth below the surface gravel cover)
HEIS = Hanford Environmental Information System
PQL = practical quantitation
Q = qualifier
U = undetected

Table B-2. 100-K-31 Cleanup Verification Data Summary.

Sample Area and Depth BGS	HEIS Number	Sample Date	Arsenic			Barium			Cadmium			Chromium			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Discolored Soil 2' to 3'6" bgs	J015W2	12/16/03	2		0.37	72.2		0.02	0.03	U	0.03	3.9		0.09	0.22		0.21
Equipment Blank of J01757	J01756	01/20/04	0.29	U	0.29	1.2		0.02	0.03	U	0.03	0.19		0.04	0.2	U	0.2
Area 1 2 to 3' bgs	J01757	01/20/04	3.8		0.27	88.1		0.02	0.16		0.03	10.3		0.04	0.22	U	0.22
Area 2 2 to 3' bgs	J01758	01/20/04	2.1		0.32	54.3		0.02	0.04		0.04	6.3		0.05	0.22	U	0.22
Duplicate of J01757	J01759	01/20/04	1.7		0.34	56.3		0.02	0.07		0.04	6.8		0.05	0.22	U	0.22

Sample Area and Depth BGS	HEIS Number	Sample Date	Lead Value			Mercury		
			mg/kg	Q	PQL	mg/kg	Q	PQL
Discolored Soil 2' to 3'6" bgs	J015W2	12/16/03	43.4		0.17	5.2		0.1
Equipment Blank of J01757	J01756	01/20/04	0.46		0.17	0.01	U	0.01
Area 1 2 to 3' bgs	J01757	01/20/04	5.3		0.16	0.54		0.02
Area 2 2 to 3' bgs	J01758	01/20/04	3.9		0.19	0.17		0.01
Duplicate of J01757	J01759	01/20/04	5.2		0.2	0.1		0.02